

IX. *On the natural affinities of the Lepidopterous family Ægeriidae.* By ARTHUR G. BUTLER, F.L.S., F.Z.S., &c.

[Read March 6th, 1878.]

(Pl. V.)

THE *Ægeriidae*, or Clear-wing moths have long been left in peace at the head of the Heterocerous *Lepidoptera*; and, notwithstanding their entire dissimilarity from the typical *Sphingidae* in all their stages of development, nobody, to my knowledge, has hitherto attempted to locate them in a more natural position.

The slight semblance of affinity to certain of the true *Sphinges* in the form of the antennæ and expansion of the caudal tuft of some genera of Clear-wings, appears to be the sole cause of the long association of these two widely-differing families; but a microscopic comparison of the antennæ of *Hemaris* (*Sesia* of British lists) with those of *Sphecia* reveals a complete dissimilarity of structural detail. (See figs. 3, 4.)

The antennæ of *Hemaris* (fig. 3) are neither pectinated nor laminated, but their anterior surface is crossed at regular intervals by serried ranks of slightly-curved stiff hairs; whereas in *Sphecia* (fig. 4) the anterior surface is deeply and coarsely laminated, each lamina being set with short bristles; in this genus, also, the apex of the antenna terminates in a well-marked pencil of rigid hairs.

The expanded caudal tuft found in *Ægeria*, and one or two other genera, is shared in common with other families beside the *Sphingidae*, and is far more constant among the members of that group which I am constrained to regard as nearest to the *Ægeriidae*, than it is amongst the typical Hawk-moths.

So far for the only points which the *Sphingidae*, to a casual observer, seem to have in common with the *Ægeriidae*, for I suppose no entomologist who knows anything of extra-European moths would for a moment take the transparent character of the wings in some genera

of these two families into consideration. The more salient structural differences between these groups, in addition to that noted above, may be roughly summed up as follows:—

SPIINGIDÆ.	ÆGERIIDÆ.
<i>Palpi</i> short and thick.	<i>Palpi</i> medium or long and far more slender.
<i>Lateral margins of the body</i> continuous. (Cf. fig. 23.)	<i>Lateral margins</i> constricted behind the thorax. (Cf. fig. 22.)
<i>Posterior legs</i> rather short, thick, usually with the tibiæ smooth and armed with short spines.	<i>Posterior legs</i> long, slender, the tibiæ frequently clothed with tufts or masses of hair, always with long spines, the tarsi sometimes adorned with hairy tufts.
<i>Anterior wings</i> broad and trigonate, with short discoidal cell.	<i>Anterior wings</i> narrow, elongate subpyriform, with long discoidal cell.
<i>Posterior wings</i> small, with very short discoidal cell.	<i>Posterior wings</i> large, with medium-sized discoidal cell.

The differences in the perfect insects therefore cover their entire structure, whilst the larvæ of the two families are as unlike, both in aspect and economy, as any two representatives of the same order can well be.

Some few years ago, when Mr. Stretch, of San Francisco, was in England, he and I were somewhat exercised in mind respecting the affinities of a strange little genus of Clear-winged moths from the New World. This genus, which I subsequently diagnosed under the name of *Acridura* (Ann. and Mag. Nat. Hist. 4th ser., vol. xv. p. 398), and referred with some misgivings to the *Zygenoid Arctiidæ*, is without doubt an aberrant *Ægeriid* allied to *Arauzona*, and combining the characters of the Clear-wings with those of the *Pyræles* and *Gelechiidæ*.

A careful study of all the genera which seemed to be allied to *Acridura* (figs. 5, 6) has manifested a gradation of structure from the *Ægeriidæ* to the *Pyræles* on the one hand, and from the *Ægeriidæ* to the *Gelechiidæ* on the other.

Before entering into identities and similarities of structure in the imago, it is, of course, extremely important to ascertain whether the larvæ of these three groups exhibit any similarity in general structure and economy. I have, therefore, examined into the characters as given

by Mr. Stainton, and find that the following are the only differences:—

Ægeriidae.—Larvæ with 16 feet, internal feeders.

Pyralites.—Larvæ frequently (if not always) with 16 feet, either internal feeders or rolled up in leaves.

Gelechiidae.—Larvæ with 16 feet, either internal feeders or between leaves.

Thus it is clear that some at least of the species in each of the three groups agree in the number of their feet and their habits.

The characters of the *Ægeriidae* reproduced in the *Pyrales* are as follows:—

The long-spined posterior legs in the whole family.

The general form and ornamentation of the body in *Glyphodes doleschallii*, several species of *Vitessa*, the genus *Azochis* from South America, and even in the common *Botys urticalis* of Europe.

The terminal anal tuft in *Phakellura*.

The narrow anterior wings in the Cingalese genus *Iurgia*.

The transparent wings with black veins, in *Erilusa* and several other genera; but the Pearl-moths are, for the most part, semi-transparent.

The long anal sheath of *Acridura gryllina* (fig. 6) is reproduced in various species of *Botys*, notably in *B. concordalis* from the Amazons, *B. admixtalis* from Ceylon, *B. damasalis* from China, as also in *Platamonia stenosoma* of Felder (Reise der Nov. Lep. pl. cxxxiv. fig. 16) from the Viti Islands (fig. 12).

The densely-hairy second joint to the antennæ of *Acridura metallica*, of *Tinægeria* and *Arauzona*, is found also in *Omphalocera* and *Piletocera* of Lederer's Monograph (Wien. Ent. Monatschr. VII.), and occurs in a modified form in the antennæ of *Desmia funeralis* and *Zebronia jaguaralis*. (Cf. figs. 5, 9, 13, 18, with 10 and 11.)

The remarkable antennæ of *Tarsa bombycifformis* (fig. 16), in which the pectinations are fringed with stiff hair below and terminate in strong curved spines, are almost reproduced in the European *Eurrhysis pertusalis*, which, however, differs in that the pectinations taper to a point and terminate, not in spines, but in five or six stiff-curved bristles (fig. 15). In *Thersana acuta* (which is certainly a *Pyrale*), although the antennæ are somewhat compressed, the pectinations taper less than in *Eurrhysis*, but only terminate in a single rigid bristle (fig. 14).

The lateral tuft-like processes from the subterminal segment of the abdomen, in males of the *Ægeriid* genus *Tinthia* (fig. 8) occur also in *Morocosma margaritaria*. (Cf. Lederer in loc. cit. pl. 14, fig. 7; also fig. 7 of my plate.)

The tufts and brushes of hair found on the posterior legs of such genera as *Euryphrissa*, *Tarsopoda* and *Sophona* (notably also in *Myllittia*), are evidently not unknown among the *Pyrales*. (See *Idia? scopipes* of Felder, in *Reise der Nov. Læp.* cxxxvi. fig. 39; cf. figs. 1, 2, 17, 20, 21.)

Thus I have shown that the whole of the marked structural characteristics of the *Ægeriidæ* are to be met with among the *Pyrales*, and therefore it only remains for me to make good my view of the affinity which they also exhibit to the *Gelechiidæ*.

The difficulty of pointing out the resemblance of the *Ægeriidæ* to the *Gelechiidæ* is nothing to that of determining where the line of demarcation between the two families is to be drawn; thus *Tinægeria* (fig. 18) is apparently a small form of *Ægeriid* with long slender-curved palpi, and a hairy second joint to its antennæ; it is, without doubt, allied to *Arauzona* (fig. 9) and to *Acridura*, less nearly to *Tinthia*, which is close to *Ægeria*; on the other hand, the *Gelechiid* genus *Exodomorpha* (fig. 19) (*Staintonia*, Staud.) is evidently the African representative of the New World genus *Tinægeria*; indeed I have hitherto only found one structural character to distinguish them by, namely, the form of the secondaries; yet *Exodomorpha* chiefly differs from *Gelechia* in the hairy second joint to its antennæ, and the non-indented apex of its posterior wings.

I think, therefore, however conservative our views may be, the similarities of structure occurring between the Clear-wings and the two groups of moths with which I have compared them above, will make it necessary for us to place them after the *Pyrales* and before the *Gelechiidæ*.

EXPLANATION OF PLATE.

- Fig. 1. Posterior tarsus of *Sophona halictipennis*, Walker.
 2. „ tibia and tarsus of *Euryphrissa plumipes*, Walker.
 3. Antenna of *Hemaris bombylifformis*, Linn.
 4. „ „ *Sphecia apiformis*, Linn.
 5. „ „ *Acridura metallica*, Butler.
 6. *Acridura gryllina*, Butler.
 7. Body of *Morocosma margaritaria*, Lederer.
 8. „ *Tinthia constricta*, Butler.
 9. *Arauzona basalis*, Walker.
 10. Antenna of *Zebronia jaguaralis*, Guénée.
 11. „ „ *Desmia funeralis*, Hübner.
 12. Body of *Platamonia stenosoma*, Felder.
 13. Head of *Tinægeria*.
 14. Single pectination of antenna in *Eurrhypis pertusalis*, Hübner.
 15. „ „ „ *Thersana acuta*, Walker.
 16. Part of antenna of *Tarsa bombycifformis*, Walker.
 17. Body and posterior legs of *Idia ? scopipes*, Felder.
 18. *Tinægeria ochracea*, Walker.
 19. *Exodomorpha divisella*, Walker.
 20. Hind leg of *Botys glaucusalis*, ♂, Walker.
 21. „ „ *Tarsopoda remipes*, Butler.
 22. Body of *Sphecia apiformis*, Linn.
 23. „ *Hemaris*.